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Attorney Reference Number 450-68249-01
Application Number 10/811,086

Claims

1. (currently amended) An apparatus for electrically connecting a first electrical conductor of at least one electrical circuit carried by a rotatable steering wheel of a vehicle to a second electrical conductor of an electrical circuit separated from the steering wheel of the vehicle, the apparatus comprising:

first and second annular housing sections, the housing sections being assembled together so as to define a hollow interior chamber, the assembled housing sections defining a steering column receiving opening therethrough and through which a portion of the steering column is insertable;

the first and second housing sections being rotatable relative to one another with the first housing section being coupled to the steering wheel for rotating with the rotation of the steering wheel and the second housing section being coupled to the steering column so as to remain stationary as the steering wheel is rotated;

a first electrical contact carried by the first housing section for connection to the first electrical conductor and a second electrical contact carried by the second housing section for connection to the second electrical conductor;

at least a first electrically conductive annulus carried by one of the first and second housing sections, at least a portion of the first annulus surrounding the steering column receiving opening, the first annulus being electrically coupled to one of said first and second electrical contacts; and

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at least a first electrically conductive elongated finger carried by the other of said first and second housing sections, the finger being electrically coupled to the said other of said first and second electrical contacts, the finger comprising a finger contact pad portion which is positioned to slide in contact with the first annulus when the housing sections are assembled and the steering wheel is rotated such that the first electrical contact is electrically connected to the second electrical contact and the first electrical conductor is electrically connected to the second electrical conductor when the first electrical conductor is connected to the first contact and the second electrical conductor is connected to the second contact;

wherein the contact pad portion is positioned at one end portion of the finger and projects outwardly from a surface of the finger and being substantially cylindrical; and

wherein the finger comprises a body, the body comprising a contact portion positioned at another end portion of the finger and extending in an exterior direction, the other of said first and second housing sections defining a contact portion receiving opening through which the contact portion projects, wherein the contact portion comprises the second electrical contact.

2. (original) An apparatus according to claim 1 wherein the annulus comprises an electrical contact surface facing toward the interior of the chamber, the electrical contact surface extending three hundred and sixty degrees about the center of the steering column receiving opening.

3. (original) An apparatus according to claim 2 wherein the electrical contact surface is planar.

4. (original) An apparatus according to claim 2 wherein the annulus comprises a body, a first contact tab projecting from the body in a direction away from the interior of the chamber, the said one of the first and second housing sections comprising a first contact tab receiving opening through which the first tab extends such that the first tab is accessible from the exterior of the said one of the first and second housing sections, the first tab comprising the first electrical

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contact, the body further comprising a plurality of crimping tabs, the said one of the first and second housing sections comprising a plurality of crimping tab receiving openings, the crimping tabs respectively extending in an exterior direction through the respective crimping tab receiving openings and then being crimped at the exterior of the said one of the first and second housing sections to retain the annulus in position relative to the said one of the first and second housing sections.

5. (original) An apparatus according to claim 4 wherein the body, the first tab and the crimping tabs are formed from a planar sheet of electrically conductive material.
6. (original) An apparatus according to claim 4 wherein the body is in the shape of a ring.
7. (original) An apparatus according to claim 1 wherein the finger is arcuate in shape and extends from the said other of said first and second housing sections toward the said one of said first and second housing sections, the finger also comprising a base which is mounted to an interior surface of the said other of the first and second housing sections.
8. (original) An apparatus according to claim 7 wherein the finger extends through an arc in excess of ninety degrees about the center of the steering column receiving opening.
9. (original) An apparatus according to claim 7 wherein the finger comprises a resilient member, the finger contact pad portion engaging the annulus and being deflected toward the said other of the first and second housing sections upon assembly of the first and second housing sections, and wherein the finger is biased toward the annulus when the first and second housing sections are assembled.

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10. (original) An apparatus according to claim 9 wherein the finger comprises a body, the body comprising a second contact tab which extends in an exterior direction, the said other of the first and second housing sections defining a second contact tab receiving opening through which the second tab projects, the second tab comprising the second electrical contact.

11. (original) An apparatus according to claim 10 wherein the finger comprises a base portion mounted to the interior surface of the said other of the first and second housing sections, the second tab projecting from the base portion, and wherein the body comprises an elongated resilient portion that projects from the base portion.

12. (original) An apparatus according to claim 11 wherein the entire finger is formed from a single sheet of electrically conductive material except for the finger contact portion.

13. (original) An apparatus according to claim 1 wherein the first and second housing sections are configured to engage one another and snapfit together at a location adjacent to the steering column receiving opening.

14. (original) An apparatus according to claim 13 wherein the said one of the first and second housing sections is the first housing section coupled to the steering wheel and the said other of the first and second housing sections is the second housing section coupled to the steering column.

15. (original) An apparatus according to claim 14 further comprising a bracket mounted to the steering column, the second housing section comprising plural spaced apart openings aligned with corresponding openings of the bracket, and detachable fasteners interconnecting the second housing section to the bracket to thereby couple the second housing section to the steering column.

16. (original) An apparatus according to claim 1 wherein the electrical circuit carried by the steering wheel comprises a horn switch and the electrical circuit coupled in part to the steering column comprises a portion of a vehicle horn circuit.

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17. (original) An apparatus according to claim 1 wherein the electrical circuit carried by the steering wheel comprises a steering wheel heater circuit and wherein the electrical circuit carried by the steering column comprises a portion of a heater power supply circuit.

18. (original) An apparatus according to claim 1 wherein there are at least two electrically conductive annuli carried by the said one of the first and second housing sections, each of said annuli comprising a respective electrically conductive surface which is concentric with the center of the steering column, the electrically conductive surfaces of the first and second annuli being electrically isolated from one another, and wherein there are at least two of said elongated fingers which are electrically isolated from one another, each of the fingers engaging a respective one of the annuli, each of the annuli and engaging finger being included in a respective electrical circuit such that interconnections between plural circuits are made.

19. (currently amended) An apparatus for electrically connecting a first electrical conductor of at least one electrical circuit carried by a rotatable steering wheel of a vehicle to a second electrical conductor of an electrical circuit separated from the steering wheel of the vehicle, the apparatus comprising:

first and second annular housing sections, the housing sections being assembled together so as to define a hollow interior chamber, the assembled housing sections defining a steering column receiving opening therethrough and through which a portion of the steering column is insertable;

the first and second housing sections being rotatable relative to one another with the first housing section being coupled to the steering wheel for rotating with the rotation of the steering wheel and the second housing section being coupled to the steering column so as to remain stationary as the steering wheel is rotated;

a first electrical contact carried by the first housing section for connection to the first electrical conductor and a second electrical contact carried by the second housing section for connection to the second electrical conductor;

at least a first electrically conductive annulus carried by one of the first and second housing sections, at least a portion of the first annulus surrounding the steering column receiving

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opening, the first annulus being electrically coupled to one of said first and second electrical contacts;

at least a first electrically conductive elongated finger having a base portion which is mounted to an interior surface of and which is carried by the other of said first and second housing sections, the base portion not extending about the entire center of the steering column receiving opening, the finger being electrically coupled to the said other of said first and second electrical contacts, the finger comprising an annulus engaging distal end contact portion spaced from the base portion and which is positioned to slide in contact with the first annulus when the housing sections are assembled and the steering wheel is rotated, such that the first electrical contact is electrically connected to the second electrical contact and the first electrical conductor is electrically connected to the second electrical conductor when the first electrical conductor is connected to the first contact and the second electrical conductor is connected to the second contact;

wherein the finger comprises a body portion extending from the base portion to the distal end contact portion that is arcuate in shape and extends from the said other of said first and second housing sections toward the said one of said first and second housing sections, ~~the finger also comprising a base which is mounted to an interior surface of the said other of the first and second housing sections wherein the base portion is shorter in length than the body portion;~~ and

wherein the base and body portion of the finger extends through an arc in excess of ninety degrees about the center of the steering column receiving opening; and wherein the contact portion has a circular cross-section.

20. (original) An apparatus according to claim 19 wherein the finger comprises a body, the body comprising a second contact tab which extends in an exterior direction, the said other of the first and second housing sections defining a second contact tab receiving opening through which the second tab projects, the second tab comprising the second electrical contact.

21. (original) An apparatus according to claim 20 wherein the body comprises a base portion mounted to the interior surface of the said other of the first and second housing sections, the base portion being shorter in length than the finger.

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22. (currently amended) An apparatus for electrically connecting a first electrical conductor of at least one electrical circuit carried by a rotatable steering wheel of a vehicle to a second electrical conductor of an electrical circuit separated from the steering wheel of the vehicle, the apparatus comprising:

first and second annular housing sections, the housing sections being assembled together so as to define a hollow interior chamber and a steering column receiving opening therethrough and through which a portion of the steering column is insertable;

the first and second housing sections being rotatable relative to one another with the first housing section being coupled to the steering wheel for rotating with the rotation of the steering wheel and the second housing section being coupled to the steering column so as to remain stationary as the steering wheel is rotated;

a first electrical contact carried by the first housing section for connection to the first electrical conductor and a second electrical contact carried by the second housing section for connection to the second electrical conductor;

at least a first electrically conductive annulus carried by the first housing section, the first annulus being electrically coupled to the first electrical contact, the first annulus comprising a planar electrical contact surface facing toward the interior of the chamber and extending three hundred and sixty degrees about the steering column receiving opening, and wherein the first annulus comprises a body formed from a single sheet of material, the body comprising a first projecting tab which is bent to extend in an exterior direction, the first housing section comprising a tab receiving opening through which the first tab extends such that the first tab is accessible from the exterior of the first housing section, the first tab comprising the first electrical contact, the body further comprising a plurality of crimping tabs, the first housing section comprising a plurality of crimping tab receiving openings, the crimping tabs being bent to extend in an exterior direction through the respective crimping tab receiving openings and then being crimped at the exterior of the first housing section to retain the ring in position relative to the first housing section;

at least a first electrically conductive elongated finger carried by the second housing section, the finger being electrically coupled to the second electrical contact, the finger comprising a distal end portion with a substantially cylindrical contact portion projecting outwardly from the distal end portion of the finger, the contact portion which is being positioned

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to slide in contact with the electrical contact surface of the first annulus when the housing sections are assembled and the steering wheel is rotated, wherein the finger is arcuate in shape, the finger comprising a base which is mounted to an interior surface of the second housing section, wherein the finger comprises a resilient member, the finger contact portion engaging the electrical contact surface of the annulus, and the resilient member being deflected toward the first housing section upon assembly of the first and second housing sections, and wherein the finger is biased toward the electrical contact surface of the annulus when the first and second housing sections are assembled, and the base comprising an electrical contact forming second tab projecting from the base in an exterior direction, said second housing section defining a second contact tab receiving opening through which the second contact tab projects, the second contact tab comprising the second electrical contact.